

## **REMARKS**

### **A. Status of the Claims**

Claims 24-41 were pending at the time of the Office Action. Claims 24, 36 and 41 have been amended. Claim 32 is cancelled. Therefore, claims 24-31 and 33-41 will be pending upon entry of the requested amendments.

### **B. Claims 24-32 are Definite as Required by 35 U.S.C. 112, Second Paragraph**

Claims 24-31 are rejected under 35 U.S.C. 112, second paragraph. The language “the target analyte” within claim 24 has been amended to read “a target analyte,” which corrects the antecedent basis issue noted by the Examiner. The current §112 rejection is therefore overcome.

### **C. Claims 24-31, 33, 34 and 41 are Patentable over Xu et al.**

The Office rejects claims 24-31, 33, 34 and 41 as being allegedly anticipated by U.S. Patent No. 6,858,439 to Xu *et al.* (Xu). Applicant traverses.

#### **1. Independent Claim 24 is Not Anticipated**

Claim 24 has been amended to incorporate the subject matter of claim 32 (now cancelled), which the Examiner has already indicated as being allowable. Therefore, claim 24 is believed to be in condition for allowance. For at least the same reasons, dependent claims 25-31 are believed to be allowable as well.

Claim 24 has also been amended for clarity, in a non-narrowing manner, by reordering the recited “linking element.” This amendment does not affect current rejections or the Examiner’s search.

#### **2. Claim 33 is Not Anticipated**

Claim 33 recites a method for identifying one or more complexes within a sample comprising (a) admixing with the sample a plurality of engineered microparticles, each

microparticle having a different dielectric constant, (b) associating the plurality of engineered microparticles with one or more target analytes to form one or more complexes; and (c) identifying the one or more complexes by distinguishing between the different dielectric properties using one or more impedance sensors or different dielectrophoretic responses to AC electrical fields of various frequencies.

**a. Part (a) of Claim 33 is Not Disclosed**

Xu fails to disclose or suggest at least part (a) of claim 33 because Xu does not disclose admixing with the sample a plurality of microparticles where **each microparticle has a different dielectric property**, and this element is not inherent in Xu's disclosure. The Examiner claims that such a mixture is inherent in Xu because "[m]ore than one moieties of a sample can be separated" and "[m]icroparticles with different binding partners can be prepared to separate more than one moieties of a sample." *See* Office Action at p. 4.

A claim is inherently anticipated only if "the missing descriptive material is 'necessarily present,' not merely probably or possibly present, in the prior art." *Trintec Indus., Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 1295 (Fed. Cir., 2002) (citations omitted). Microparticles of different dielectric properties are not necessary in Xu to separate moieties of a sample. Xu notes that dielectrophoretic separation is achieved by altering the dielectric properties of a **component of the sample** (not the microparticle). *See* Xu, col. 17, lines 31-36. Several means to alter these properties are listed; for example, the dielectric properties of a component of a sample may be modified by using chemical means to add or remove portions of the component (*see* Xu, col. 21, line 40 – col. 22, line 29) or charge properties of the component may be altered (*see* Xu, col. 22, line 30 – col. 23, line 9). While both of these methods can be used to facilitate separation of more than one moieties, neither involves microparticles of different dielectric properties. In fact,

both involve altering certain properties of the **sample**, which claim 33 clearly distinguishes from **microparticles**.

For at least these reasons, Applicant respectfully requests that the anticipation rejection for claims 33 and 34 be withdrawn.

**b. Part (c) of Claim 33 is Not Disclosed**

Xu fails to disclose or suggest at least part (c) of claim 33 because Xu does not disclose, either explicitly or inherently, (i) identifying complexes by a process of distinguishing and (ii) distinguishing between different dielectric properties using impedance sensors or dielectrophoretic responses to AC electric fields. In rejecting part (c) of claim 33, the Examiner states “[d]istinguishing between the dielectric properties must be **inherently** achieved.” *See* Office Action at p. 5 (emphasis added). Distinguishing between dielectric properties using **impedance sensors** or **dielectrophoretic responses** is not explicitly disclosed in Xu, nor are those features necessarily present. Other methods, such as consulting a table of dielectric properties, may be used to distinguish between dielectric properties. Additionally, the Examiner fails to demonstrate that **identifying complexes** by distinguishing dielectric properties is anticipated by Xu, either explicitly or inherently.

For at least these reasons, Xu fails to anticipate claims 33 and 34.

**3. Claim 41 is Not Anticipated**

Amended claim 41 recites a method for detecting a complex within a sample comprising (a) admixing with the sample a linking element and an engineered microparticle comprising a conductive core and an insulating layer coating the conductive core, the insulating layer having a thickness sufficient to render the engineered microparticle maneuverable by dielectrophoresis, (b) associating the engineered microparticle with a target analyte to form the complex, the

complex having a second dielectric property, and (c) detecting the complex by distinguishing between the first and second dielectric properties using different dielectrophoretic responses to AC electrical fields of various frequencies. Claim 41 was amended in the interest of clarity only; the amendment does not narrow the scope of the claim.

**a. Part (c) of Claim 41 is Not Disclosed**

Xu fails to disclose or suggest at least part (c) of claim 41 because Xu does not disclose a method for detecting a complex in a sample by distinguishing between the dielectric properties of an engineered microparticle and those of an engineered microparticle-target analyte complex. The Examiner states that, in Xu, “[d]istinguishing between the dielectric properties must be inherently achieved in order to isolate the different moieties of interest.” *See* Office Action at p. 5. However, reference to the cited portions of Xu reveals that any distinction, if any occurs, is between dielectric properties of a binding partner and those of components in the sample other than the moiety of interest. *See* Xu, col. 28, lines 27-29 (stating that “the binding partner’s dielectric properties should be significantly different from those of other sample components”). Xu does not anticipate, either explicitly or inherently, distinguishing between the dielectric properties of an engineered microparticle and those of a microparticle-analyte complex, as required by claim 41.

Applicant therefore requests that the current anticipation rejection to claim 41 be withdrawn.

**D. Claims 24-31, 33-34 and 36-39 Are Patentable over Ewart and/or Parton**

The Office rejects claims 24-31, 33-34 and 36-39 as being obvious over U.S. Patent No. 5,922,537 to Ewart *et al.* (Ewart) in view of U.S. Patent No. 5,653,859 to Parton *et al.* (Parton). Applicant traverses.

**1. Claim 24 is not Rendered Obvious**

Claim 24 has been amended to incorporate the subject matter of claim 32 (now cancelled), which the Examiner has already indicated as being allowable. Therefore, claim 24 is believed to be in condition for allowance. For at least these same reasons, dependent claims 25-31 are believed to be allowable also.

**2. Claim 33 is not Rendered Obvious**

Claim 33 recites a method for identifying one or more complexes within a sample comprising (a) admixing with the sample a plurality of engineered microparticles, each microparticle having a different dielectric constant, (b) associating the plurality of engineered microparticles with one or more target analytes to form one or more complexes; and (c) identifying the one or more complexes by distinguishing between the different dielectric properties using one or more impedance sensors or different dielectrophoretic responses to AC electrical fields of various frequencies.

The combination of Ewart and Parton does not render claim 33 obvious at least because the Examiner has not established that either Ewart or Parton teach either part (a) or part (c) of claim 33. “To establish *prima facie* obviousness of a claimed invention, **all the claim limitations** must be taught or suggested by the prior art” (emphasis added). MPEP 2143.03. The Examiner has failed to meet this burden.

According to the Examiner, “[i]t would have been obvious to one of ordinary skill in the art to use the engineered particles of Ewart in a plurality for detecting one or more complexes within one sample which is economically advantageous because time and effort can be saved and mass detection/sorting/separation can be performed all in one batch.” See Office Action at pp. 8-9. However, neither Ewart nor Parton teaches or suggests admixing with a sample a plurality of

microparticles each having a different dielectric property. The Examiner explicitly states that “Ewart fails to teach ... adding to the sample a plurality of engineered microparticles in a method of identifying one or more complexes within a sample,” *see* Office Action at p. 6, and provides no evidence that Ewart suggests performing this step. Similarly, the Examiner cites no evidence that Parton teaches or suggests admixing with a sample a plurality of microparticles each having a different dielectric property.

Additionally, the Examiner has not asserted or cited evidence to show that either Ewart or Parton teach or suggest a method for **identifying** one or more complexes within a sample, as is required by claim 33.

Therefore, claim 33 is believed to be in condition for allowance. For at least these same reasons, dependent claim 34 is believed to be allowable also.

### **3. Claim 36 is not Rendered Obvious**

Amended claim 36 recites a method for detecting a complex within a sample comprising (a) admixing with the sample a linking element and an engineered microparticle comprising a conductive core, and an insulating layer coating the conductive core, the insulating layer having a thickness sufficient to render the engineered microparticle maneuverable by dielectrophoresis, (b) associating the engineered microparticle with a target analyte to form the complex, the complex having a second dielectric property, and (c) detecting the complex by distinguishing between the first and second dielectric properties using one or more impedance sensors. Claim 36 was amended in the interest of clarity only; the amendment does not narrow the scope of the claim.

Claim 36 is not obvious over Ewart in view of Parton at least because not every element of claim 36 is recited in either Ewart or Parton. According to the Examiner, “[i]t would ... have

been obvious to one of ordinary skills in the art to use the impedance sensors as a detection means taught by Parton in the method of Ewart for detecting different dielectrophoretic properties of the particles since impedance sensors is means [sic] for distinguishing the different dielectric properties of the particles.” See Office Action at p. 9. However, also according to the Examiner, “Ewart fails to teach ... admixing with the sample an engineered microparticle having a first dielectric property; associating the engineered particle with a target analyte to form a complex having a second dielectric property and detecting the complex by distinguishing between the first and second dielectric properties using one or more impedance sensors.” See Office Action at p. 6-7. Of the three elements of claim 36 which the Examiner admits are lacking in Ewart, only detection using impedance sensors is asserted to be present in Parton. “To establish *prima facie* obviousness of a claimed invention, **all the claim limitations** must be taught or suggested by the prior art” (emphasis added). MPEP 2143.03. The Examiner has failed to demonstrate or show that Parton discloses either admixing with a sample an engineered microparticle having a first dielectric property or associating an engineered microparticle with a target analyte to form a complex having a second dielectric property. The Examiner only claims that it would be obvious to combine Parton’s use of impedance sensors with “the method of Ewart.” See Office Action at p. 9. However, by the Examiner’s admission, the “method of Ewart” is missing several elements of claim 36. See Office Action at p. 6-7.

Moreover, the Examiner has failed to establish a motivation to combine. “When the motivation to combine the teachings of the references is not immediately apparent, it is the duty of the examiner to explain why the combination of the teachings is proper.” MPEP 2142 (citing *Ex parte Skinner*, 2 USPQ2d 1788 (Bd. Pat. App. & Inter. 1986)). Not only is there no evidence that Parton discloses the steps of (i) admixing with a sample an engineered microparticle having

a first dielectric property and (ii) associating an engineered microparticle with a target analyte to form a complex having a second dielectric property, no rationale has been provided demonstrating a motivation to combine a technique of Ewart with either of these two steps. Applicant respectfully submits that a combination of Ewart with Parton would be improper at least because such a combination would render the art unsatisfactory for its intended purpose and/or change its principal of operation. *See* MPEP 2143.01.

Applicant respectfully requests that the current rejection to claims 36-39 be withdrawn.

**E. Conclusion**

All pending claims are believed to be in condition for allowance. Should the Examiner have any questions, comments, or suggestions relating to this application, he is invited to contact the undersigned attorney at (512) 536-3018.

Respectfully submitted,

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